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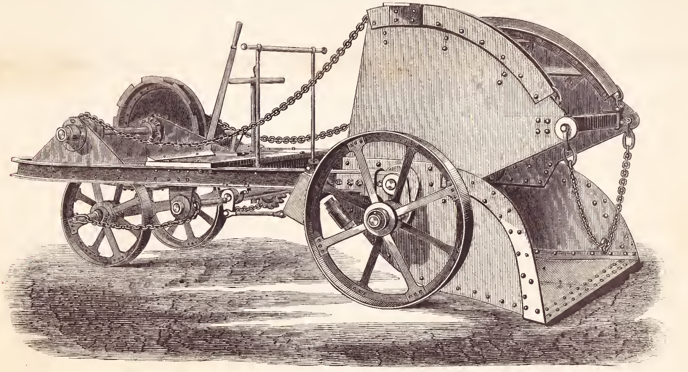
Steam Scoop.

WE illustrate by an engraving reproduced from *The Engineer* a very powerful implement now in the Kilburn showyard. This is a steam scoop intended for excavating large quantities of soil. The journal referred to states that this implement is being employed in Australia with great success, sinking excavations or "dams" as much as 24 ft. deep in the beds of rivers for the purpose of holding water during the dry season.

The merit of the invention of the scoop is mainly due to Mr. Peter Waite, who, finding it impossible by manual labor or use of bullocks to get down to any great depth, or within any reasonable time, so as to utilize the large extent of dry country in the Paratoo Run, early in 1875 turned his attention to the application of steam power in the forming of deep artificial water-holes. Visiting England, he, in conjunction with Messrs. John Fowler & Co., devised and patented the steam scoop, which, after some modification, has now reached a very high state of perfection. The ground is first ploughed over by a powerful balance plough, which is followed by the scoop, which, being drawn forwards, becomes filled with earth. The scoop is then raised, and the implement with its load is hauled to a suitable place, and its contents tipped. Two 16 horse-power engines are employed, one on each bank. The scoop is bell-mouthed, 7 ft. 6 in. wide at the mouth, but is 6 ft. broad at the narrowest part, 6 ft. from back to front, and about 4 ft. deep at the shallowest part. When fairly full it holds two and a half cubic yards of earth. The removal by plough and scoop of from 1,500 to 2,000 yards of stuff is considered a fair week's work; but with long hours 3,000 yards can be reached in the same time. The steam engines being placed on the banks, a wire rope is attached to each end of the plough, which is drawn backward and forward in the bottom of the dam, tearing up to a depth of say 10 in. to 12 in. the most obstinate clay. The plough having completed its loosening work, the scoop takes its place, drawn forward by the one engine into the loose clay lying at the bottom of the dam. It is, when full, drawn back up the same side of the excavation by the other engine, and there at a suitable distance it, by an ingenious arrangement, empties itself and spreads its stuff as it is discharging. The cost of excavating a dam to 12 ft. by the old process was 10d. to 1s. a cubic yard. The steam plough and scoop, when in fair working order, go to a depth of 24 ft. at a cost of 6d. a cubic yard.

This machine is manufactured by Messrs. John Fowler & Co., engineers, Leeds, England.



STEAM SCOOP FOR EARTH EXCAVATOR.

Clock and Watch-making Statistics.

ACCORDING to statistics recently given in *La Nature*, France now produces chronometers, watches, time-pieces, clocks to an amount of about 65 million francs in value; Switzerland (watches), 60 millions; America (watches and timepieces), 32; England (chronometers, watches), 16; Austria (timepieces), 10; Germany (timepieces and a few thousand watches), 25. This gives a total considerably over 200 million francs for the watchmaking production of the whole world; and the figure, it is noted, assumes still greater importance on remembering that raw material enters into it to a comparatively small extent, while the salaries of workmen are very high. Few industries present results so advantageous. It appears, further, that in manufacture of timepieces, France makes about a million different pieces annually; Germany produces more, about two millions, but the average price is much lower; America supplies at least 700,000 or 800,000. With regard to watches, Switzerland stands foremost with an annual production of 1,500,000; then comes France, with nearly 500,000; the United States make 300,000 to 350,000, and England about 200,000. The enormous total is 2,500,000 watches and nearly four million timepieces, "cuckoo" clocks, etc., dispersed every year over the globe.

Splitting Paper.

IT is one of the most remarkable properties of that wonderful product, paper, that it can be split into two or even three parts, however thin the sheet. We have seen a leaf of the *Illustrated News* thus divided into three parts, or three thin leaves. One consisted of the surface on which the engravings are printed; another was the side containing the letter press, and a perfeetly blank piece on each side was the paper that lay between. Many people who have not seen this done might think it impossible; yet it is not only possible, but extremely easy, as we shall show.

Get a piece of plate glass and place on it a sheet of paper; then let the latter be thoroughly soaked. With care and a little dexterity the sheet can be split by the top surface being removed. But the best plan is to paste a piece of cloth or strong paper to each side of the sheet to be split. When dry, violently and without hesitation pull the two pieces asunder, when part of the sheet will be found to have adhered to one and part to the other. Soften the paste in water and the pieces can be easily removed from the cloth.

The process is generally demonstrated as a matter of curiosity, yet it can be utilized in various ways. If we want to paste in a scrap-book a newspaper article printed on both sides of the paper, and possess only one copy, it is very convenient to know how to detach the one side from the other. The paper, when split, as may be imagined, is more transparent than it was before being subjected to the operation, and the printing ink is somewhat duller; otherwise the two pieces present the appearance of the original if again brought together.

Some time ago the information of how to do this splitting was advertised to be sold for a considerable sum. We now impart it to all our readers gratuitously.—*Design and Work.*

Scientific News,

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SALEM H. WALES. EDWARD H. WALES.

CONTENTS, August 15, 1879.

The Proposed Inter-Oceanic Canal.

THIS project seems likely to meet with opposition. The route selected is objected to by able American and English engineers, as impracticable on the ground of cost of construction, and there are many who look upon the scheme as a violation of what is known as the Monroe doctrine.

For ourselves, we look upon the proposed canal as being furthered by foreign capital more in its own than in American interests, and we decidedly favor a ship-railway in preference to a ship-canal.

It has been charged, with many reasons to back the assertion, that the Canal Congress was packed to secure the selection of the route preferred by M. de Lesseps, and that American representatives found themselves practically powerless in presence of a pre-arranged opposition. Lesseps pretends to regard the project as more beneficial to American commerce than to any other nation; but we expect Americans will be likely to think for themselves on a matter of this importance, and that in the next session of Congress a decided opposition to the scheme will be developed.

At any rate, there is no mistaking the tone of many influential newspapers, which are decidedly adverse to the scheme, and we do not think we should hazard much by a prediction, in view of the advanced age of M. de Lesseps, that he will not live to see even the beginning of the work he so earnestly advocates.

How the Public Health is Protected.

WE have a National Board of Health. A National Board of Health is a big thing. It costs a great deal of money. But the people can afford to pay a good sum for a really big thing, even if it be a big fraud. The people have paid for many big frauds, and they rather seem to like it.

According to a correspondent of the Hartford *Times*, Mr. Casey Young, who was Chairman of the House Committee on Epidemic Diseases, which gave birth to the National Board of Health, was recently anxious to have some samples of alleged disinfectants tested, for the purpose of sending some of the articles to his constituency in and about Memphis. He took the samples to the Board, but was told that the corps was too busy to make the tests, or even to have any of their employees do so, just then. They had plenty of time to talk politics, read the papers, and to smoke cigars, but testing disinfectants was an extra demand for service they were, with their present staff of officials, quite unprepared to meet. The aggregate salary paid to this corps of officials is but the paltry sum of $30,000 per month, and it stands to reason that, till the money apportioned to the Board be largely increased, the testing of disinfectants is a thing entirely unreasonable to expect.

However, Mr. Young did expect it, and called in a couple of days to ascertain the result. The result was that the samples had been lost, possibly left in some neighboring sample room. Mr. Young at last reluctantly concluded that the Board does not comprise a single person competent to make the required tests. With other samples he sadly wended his way to the Superintendent of the Marine Hospital Service, and the next day was informed that two of the preparations were worthless.

Mr. Casey Young is wiser than he was. It is not the physical, but the political health of the country the National Board of Health is looking after.

We cannot refrain from contrasting this cumbrous, expensive body of inefficients with our intelligent and energetic New York Board of Health, the President of which is one of the most expert analytical chemists the country has produced, with a nose so well educated by long experience of wholesome and unwholesome odors, that by the aid of that skillful organ he can at once determine the noxious from the innoxious in all the gases or mixtures of gases that rise from any quarter or source, be it manufactory, garbage-heap or cesspool.

Since writing the above we have learned that the National Board of Health, having begun to realize its own incompetency, has done a wise thing. It has applied to the New York Board of Health for advice in regard to a system of disinfection.

Among other queries, information was solicited in regard to the value of carbon disulphide as a disinfectant, and the reply was forwarded that the substance is too inflammable and too liable to result in explosions to be available for the purpose named, even if its properties would otherwise warrant its use. The nature of this and other inquiries confirms the truth of the opinion arrived at by Mr. Casey Young, and we don't wonder he is ashamed of his progeny.

We here take occasion to repeat, for the instruction of the National Board of Health, that sulphate of iron, commonly called copperas or green vitriol, is one of the cheapest and best disinfectants known for the ordinary purposes of disinfecting cesspools, drains, etc.

A Persistent Error.

IN his work entitled "Heat Considered as a Mode of Motion," Prof. Tyndall, when approaching the subject of the mechanical equivalent of heat, thought it necessary to stimulate the mental energies of the student by characterizing the subject as difficult. An eminent Scotch professor has been pleased to criticise this and similar expressions of Prof. Tyndall and other prominent scientific lecturers as clap-trap, designed merely to produce a sensational effect upon unscientific minds.

That the subject is really difficult of comprehension is, however, daily demonstrated by errors in writing and thinking on the part of many who possess more than average education and intelligence. As a result, deception in regard to mechanical principles is easy, and inventions claiming to perform impossibilities are palmed off as real, too often with entire or partial sanction from men who have acquired local repute as authorities in mechanical science.

In the New York *Sun* of August 1st there appeared a letter, whose style proves its author to be a man "well educated," as the saying goes, but which embodies a radical error relating to pressure and heat. The letter was entitled, "*Are the Planets Cooling Down or Firing Up?*" We presume this question, which is answered in favor of "*Firing Up*," will not be of overwhelming interest to many of our readers; but the error committed in one of the arguments employed to sustain the conclusion, and without which a conclusion opposed to facts could not have been arrived at, is of prime importance to every practical mechanic and engineer. It is one of that class of errors which constantly beguile inventors into the belief that self-moving machines are possible, and into kindred delusions, like the Keely Motor, etc.

In the course of his remarks the author says:

"It is a familiar scientific fact that pressure produces heat."

Perhaps no better exemplification of the truth that "popular letters on timely topics" (such as it has recently become the practice of the New York *Sun* and other daily papers to publish) are a medium for the propagation of popular error, could be supplied.

It is a *familiar unscientific error* that pressure produces heat, and we may also appropriately add that a similar error exists in the minds of many relative to the production of cold by expansion. Pressure, pure and simple, never produces heat, any more than expansion, pure and simple, produces cold or the disappearance of heat.

This is made perfectly clear in the work of Prof. Tyndall, above-named, to which any reader who doubts is referred; also in a treatise on Heat, by Balfour Stewart, by the researches of Joule, whose celebrated experiments antedate both of the treatises mentioned, and by many other authors. The books named have been published by D. Appleton & Co., and thus rendered accessible to all American readers who desire to be well informed on the subject; and the truth of the propositions made in this article may be tested by comparison with the works themselves.

We shall not, therefore, attempt to substantiate our propositions other than by reference to accepted authorities; but will simply enunciate the facts as now well established, and accepted as the science of the subject.

Neither pressure nor expansion can produce any calorific change, except through the performance of work. The performance of work means the overcoming of pressure through distance, and the amount of work performed is measured by reference to a unit of distance and a unit of pressure. The unit of distance ordinarily used in England and the United States is one foot, and the unit of pressure one pound. A pound weight raised one foot in height, or a pound pressure overcome through a distance of one foot in any direction, is the unit of work commonly called "foot-pound."

Now if a mass of matter press ever so hardly upon another mass, all the heat that will be produced by this pressure is measured by the work performed on the molecules of the compressed body, in reduction of its bulk. If the compressed body

be free to move as a mass, whatever mass-motion it acquires will not be represented in terms of heat, although such motion has its equivalent in terms of heat, and may be subsequently converted into heat.

The British unit of heat is the amount of heat required to heat one pound of water at 32° F. to 33° F., or one degree. The mechanical equivalent of the unit of heat so determined is 772 foot-pounds of *work*, not pressure; and nowhere in any scientific treatise can any attempt to express an equivalent of heat in terms only of pressure be found.

Much confusion exists in the popular mind on this and kindred subjects; but it is inexcusable for any man to attempt the discussion of any scientific topic involving a knowledge of molecular physics, who has not clearly comprehended these absolutely fundamental principles.

Sir William Thompson's Views on the Future of Electric Lighting Criticised.

As impartial chroniclers of current events, it is proper that we should give place to discussion on both sides of every important question which comes within the province of our journal. While declaring our belief in the future of electric lighting, in an article published July 15th, we cited as confirmatory to such belief the opinions of Sir William Thompson, whose eminence as a scientist and the attention he has given to the subject most certainly give great weight to his views. To be perfectly fair, however, we feel bound to mention that the statements made by Prof. Thompson before the Committee of Parliament on Lighting by Electricity have been severely criticised.

Mr. J. T. Sprague, an electrician and engineer, whose writings upon this and kindred subjects have attracted considerable attention (more especially in English publications) and who is himself a competitor in the solution of the problem of electric lighting, has reviewed Prof. Thompson's statements, as embodied in the report of the Committee (which, by the way, was adverse to the granting of franchises to companies at present), and has published his criticism in the *English Mechanic.*

Prof. Thompson made the following assertions:

"1. The energy which is actually used in the electric arc is about 1 horse-power per 2,400 candle-power, or even more than 2,400 candle-power, according to the dimensions and other circumstances of the electric arc."

"2. 1 horse-power of energy in the combustion of gas produces about 12 candle-power."

In reply to a question asking for an explanation of these figures, which the Committee thought "rather startling," Prof. Thompson summed up a lengthy explanation as follows:

"The upshot of all is that, allowing the practical estimate of 1 horse-power actually spent in driving the engine to produce 1,200 candles, which has been realized, I estimate that one-half of that power goes to the electric arc, and one-half is lost in heating different parts of the machine. *This, then, gives 2,400 candles for 1 horse-power*, which is the figure of my answer. In respect to gas I have taken 4 candles per cubic foot of gas per hour. I have taken the heating power of gas at 12,000 centigrade units per gramme. I have taken the specific gravity of the gas as half that of air and calculated accordingly. I have thus calculated the *whole heat of the combustion of gas*, from the amount of that per second of time, and reduced it to horse-power."

Mr. Sprague remarks, with reference to these statements, that "the statements are all true, but they are so arranged as to constitute a complete chain of special pleading, and to convey an absolutely false impression of what the facts themselves really mean. The statements are *true as to the energy actually in the lights.* The impression they produce *is false as to the energy necessary to produce the lights.*"

The gross or potential energy of the combustion of a pound of coal is about 13,000 centigrade heat-units; but the net energy is the amount which can be realized in an engine for converting this heat into work; and this, in the very best types of steam engines, and with every refinement of engineering, requires the combustion of two and one-half pounds of coal per horse-power per hour, while the average consumption in engines as they are to be found is about seven pounds per hour per horse-power.

In view of these facts, Mr. Sprague, with justice, alleges that Prof. Thompson "has charged the gas light with the gross energy, and the electric light with the net energy, as indicated by the italics in his evidence, and people who do not understand this, like the writers in the daily press, of course imagine that these figures so seriously stated are really true!"

He then proceeds to make "an equitable comparison," using, as far as possible, Prof. Thompson's own figures:

"One horse-power is 33,000 feet-lb. per minute, or 1,980,000 per hour. Expressed in heat-units of 1 lb. water 1° Cent., which equals 1,390 feet-lb., 1 horse-power per hour equals 1,424.5. This, then, is the potential energy of the 4 cubic feet of gas, giving 12 candles light."

"To put the 1 horse-power of energy into the electric arc another 1 horse-power is of necessity expended in the circuit and must be charged, because the gas compared with it is the whole amount necessary. But to produce 1 horse-power in a steam engine involves a consumption of coal varying from 2.5 lb. in the most perfect and expensive engines known, to 8 and even 10 lb. in common engines. Let us take 4 lb. as a very fair engine's work, and we have 8 lb. coal expended in generating the 2,400 candles mentioned. Now the potential energy of 1 lb. of average coal is 13,000 heat-units, or in 8 lb. 104,000."

"Instead of having the energy per candle:

Gas........1,424.5 ÷ 12 = 118.7
Electricity...1,424.5 ÷ 2,400 = .597

This being what Sir W. Thompson makes it appear to be, we have by equitable comparison:

Gas.........1,424.5 ÷ 12 = 118.7
Electricity..104,000 ÷ 2,400 = 43.3

Even then we have omitted a very important element of consideration; the gaslight needs no machinery, no capital outlay, no skilled attendance; the electric light wants all these, and if they do not form an element of the scientific calculation as to potential energy involved in the two cases, they enter very largely as factors in the practical calculation as to the potential cost. Hence the difference in the practical and so-called scientific opinions noted in the Committee's report."

"The comparisons made are, however, intrinsically erroneous, because made between electricity in its best conditions on the large scale, and gas in its worst, on the small scale, and it is well known that in all things the small scale is most costly, whether we consider the expenditure of money or of energy."

Mr. Sprague then enters into an elaborate calculation to establish the truth of his last proposition, which we are compelled to omit.

It is quite evident that there are two sides to this question, and we think in this controversy Mr. Sprague has made some strong points against Prof. Thompson. But although we quoted the favorable opinion of the latter as sustaining the hopeful views we entertain in regard to electric lighting, without having critically examined his figures as herewith given, the solid basis of our opinion lies not in what any of these conflicting foreign authorities assert, but upon knowledge of results achieved in this country. Of these results, or the means by which they are reached, we are not at present at liberty to speak more fully.

The New English Patent Law.

WE have already favorably commented upon this bill, which will probably soon come to a second reading, and have stated that, in general, we regard it as in the interest of progress. Objections to some of its provisions have, however, been raised, that will probably lead to more or less amendment of the bill as it now stands. These objections have been so ably stated in the *Chemical Review* (London) that we cannot do better than to republish a synopsis of them from that publication:

1st. The bill enacts that every invention shall be published *in extenso* before a patent is granted. The inventor has, therefore, to part with his secret before he knows whether he will be protected beyond the preliminary twelve months, and with a very great chance, indeed, of getting no patent at all.

2d. Any person after reading said specification can oppose a patent, and has the option of opposing before either the Law Officer, as at present, or before the Lord Chancellor, involving the applicant for letters patent in the latter case in the estimated expense of from £150 to £1,000 or more, only a very small portion of which cost (even if he gains the case) will the inventor be repaid in taxed costs. It will consequently lie in the power of a capitalist with opposing interest to stop a poor man from obtaining a patent altogether.

3d. The stamp duties as revised are still far higher than those of any other country, while the extra perils of patenting will probably make patents, as a rule, quite as expensive as at present.

4th. That terrible clog to struggling inventors just beginning to make their inventions pay—the £50 stamp at the end of the third year—is retained as heretofore.

5th. In order to obviate the chance of dog-in-the-manger patents, of which there are, and have been, extremely few, and those of very little importance or inconvenience, the bill obliges patentees to grant licenses on such terms as the Lord Chancellor for the time being may consider fair. This involves two serious evils vastly worse than the one it is designed to rectify.

The Lord Chancellors (from the nature of their training not conversant with the details of manufacture) may have, and as a fact usually have, a very small appreciation of the value of inventions, and may, and probably will, by their decisions, reduce the value of patents to very small amounts, while the heavy and needless taxes on all patents, valuable or not, remaining as heretofore, all inducements to risk time, labor and money in inventing will be taken away.

It will open a way (and the easiest possible way, too), by compelling the patentee to grant licenses, for a wealthy manufacturer with money invested in an inferior manufacture to kill any new invention by placing on the market purposely badly manufactured goods made in accordance with the new invention (and even with the name of the inventor inscribed thereon) alongside goods of the old make, but of superior workmanship. The public, then, finding it (so manufactured) less efficient than the old article, will take a prejudice against the new one generally, and the invention, owned perhaps by a poor man, with no means to fight the unjust prejudice, will fall into disuse until the patent expires, killed by the third or seventh year stamp duties.

THE importance and timeliness of the rules for the treatment of apparently drowned persons, published in our issue of July 1st, is exemplified by the fact that on the last day of July no less than thirteen deaths from drowning were reported in the daily newspapers. In a number of these cases there is reason to believe the intelligent and persevering application of the treatment alluded to would have restored the patients. We, therefore, feel justified in again calling attention to the rules which were printed on page 151 of the above-named issue.

A Chapter on Rats.

THE rat is the most cosmopolitan of all creatures save one. Mr. Darwin found it in the Island of Ascension living upon turtles. It came originally from beyond the Volga, and only entered England in the last century. The brown rat is a stronger rat than his predecessor, the old English black rat, and has almost entirely supplanted him. There are a few of the latter kind still remaining in retired districts. Till lately several colonies existed in certain parts of London. The browns held the sewers, but the blacks still kept possession of a great brewery or two, and of the district of the sugar refineries at Whitechapel, and they were still in force in the neighborhood of the Tower.

A pair of rats produces, as a rule, thirteen litters of eight young ones each in three years, and the young ones do the same after six months old. The grand total from a single pair at the end of three years is 656,808.

The rat has migrated from England to every point of the compass. He reached India from Persia via England, and abounds now at the ports and on the coasts where he was landed by English ships.

The great wall of China, or some other obstruction, seems to have barred the migration of the rat in that direction, but he has of late reached the eastern coasts of Asia in British vessels, and is now fast penetrating China from that side. He abounds already in Japan.

There were two rats in New Zealand, the indigenous rat and the black rat, who sailed thither with the earliest emigrants. The former was a fruit-eating species, occupying his native plains and the great beech forests of the country in countless thousands, and feeding on the beech mast; and he formed a common article of food among the natives. He was an edible and useful animal in his day; but the black rat arrived in 1843 and the natives were exterminated.

Few creatures have been more terribly aggressive and destructive, even of their own kind, than the rat; and in the pursuit of their selfish aims the weakest have invariably gone to the wall. The pith of the political and moral policy of rats has ever been that "might is right."

No portion of the world can be held exempt from subjugation by the same powerful and enterprising race—the Anglo-Saxon of the rat species—except perhaps the Arctic Regions. In these uninviting realms of frost he is at present absent. Audubon speaks of the brown rat as having been unknown on the Pacific Coast as recently as 1851; this species reached the nearer coast, not with the Pilgrim Fathers, but by the same means of transport, in 1775. They arrived in Jamaica and attacked the sugar canes, and occasioned a poem by Granger, beginning "Now, Muse, let's sing of rats!" Soon after they sailed to Brazil. The

gold fever carried them to California. Somewhat later, and within our own personal knowledge, they landed in the north-western part of the great Continent, 1,000 miles from New Orleans, at St. Pauls, where the rapids of the Mississippi terminate the navigation of that river. They settled instantly in Minnesota, entered the dwelling of an English settler, and ravaged a rhubarb pie on the very night of their arrival.

Within a hundred years the irrepressible brown rat had colonized the Coasts of the United States, settled the black rat who went out soon after Columbus, and commenced the conquest of the interior. The clue to this rat's success is found in the adaptability which enables it to steal a dinner with its tail (by alternate dip and lick), gnaw through lead in search of water, snap up an unprotected baby, and carry a hen's egg, by combination, up stairs or down. An animal of such resources cannot but prevail.

It is no small matter to be blessed with a constitution fit for any climate except the extreme north, which the rat may yet adventure when he has occasion; but the omnivorous appetite is equally essential to successful emigration. The cat is a hardy creature, and can pass from the fireside to the bliss of catching mice outdoors on the coldest nights; but, hardy hunter as she is, she is immeasurably inferior to the rat in regard to her capability for colonizing. Observe her horror of water and her dainty picking of her way across any piece of damp ground which she may have to cross. But she is further spoiled for a traveler, for anything but domesticity and a homekeeping life, by her limited endurance in regard to diet. Offer her the prime of the dessert, for instance, or an egg, or even a loaf of delicious new bread, and you will see the word "impossible" written on her countenance as she rejects it. But the cat is notwithstanding, the most important means of protection against the ravages of rats.

In days of inexperience we tried guns, traps and phosphorus in vain; we then tried cats. Six cats kept an extensive homestead clear. The proper remedy in a case of rats is cats.

There has lately been published some very interesting information relating to a plague of rats in Brazil, said to occur at intervals of about thirty years, and to be simultaneous with the drying of the *Taquara*, or bamboo, which everywhere abounds in the Brazilian forests. A similar plague of rats visited the higher coffee districts of Ceylon during the year 1875, doing great damage to young and old plantations alike.

It is remarkable that the invasion of rats was simultaneous with the flowering and death of the *Nilloo* (*Strobilanthes*), which forms the greater part of the underwood of Ceylon forests, and is said to flower and die once every seven years. The most remarkable part of the plague was that the rats did not seem to devour any part of the branches they cut off, but to nip off, and leave them untouched upon the ground. So serious, indeed, was the damage done, that on some coffee estates rewards were given to coolies for every rat they caught, and it was not an uncommon thing to hear of three or four hundred rats being destroyed, on *one* estate only, per week.

Between the years 1840 and 1850 there was a similar plague in the Kalebokka coffee district, where the damage done was immense.

According to Mr. Frederick Lewis, from whose letter upon the subject to *Nature* we have gathered the facts relating to these rat plagues, the *Nilloo* is expected to die again in 1882, when, if this is a cause, another invasion of rats may be expected.

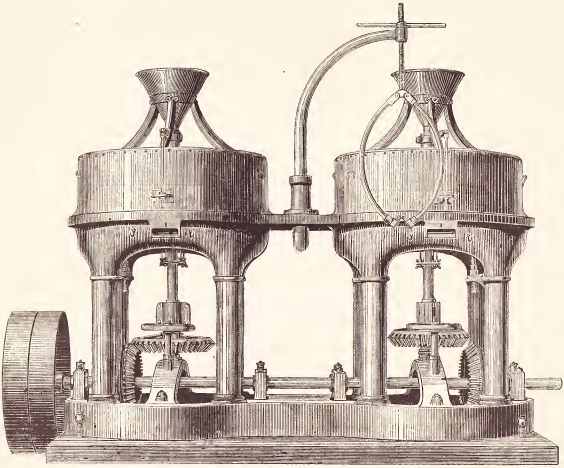
Portable Flour Mill.

WHILE the claim to superior inventive ability will not be relinquished by most Americans, we can hardly maintain any claim for superiority in the art of designing machinery. In fact, in this department of engineering we fear our American manufacturers are still inferior to our English competitors, although in designing small articles for household use or hand tools American industry may safely challenge the world.

As an illustration of a singularly neat, compact and substantial design, we have reproduced from *The Engineer* the accompaning engraving of a portable flouring mill, designed by Messrs. Clayton & Shuttleworth, of Lincoln, England, and which is one of the exhibits at the great Agricultural Exhibition recently opened at Kilburn.

The frame and bed-plate are entirely of iron. Two run of burrs are carried, each supported on four tubular columns. Each group of four columns has a common capital, the two capitals being joined by a strong horizontal plate, to which is pivoted in the centre a davit with a screw lifting apparatus for removing the stones from their places.

It would be difficult to conceive a stronger, more compact arrangement, or one in which the same weight of metal could be employed to greater advantage.



PORTABLE MILL. ENGLISH DESIGN.

Balloons for Military Purposes.

AN important improvement in the construction of military balloons has recently been suggested by Mr. C. Board, of Bristol. The chief defects of ordinary balloons as applied to service during a campaign are that they are not portable, that they take a considerable time to inflate, and that a very few shots from the hostile camp may suffice to bring the balloon to a premature end. Mr. Board has very ingeniously suggested that balloons for such purposes should be constructed, not, as is usual, in one piece, but in parts like the separate portions or carpels of an orange. These separate portions would be comparatively portable, even when inflated, and could be put together at a few minutes' notice. To secure the utmost portability, it is proposed to construct these portions of a material impervious to gas, and to inflate them with pure, or nearly pure, hydrogen. The lifting power of this gas being about eight times as great as that of coal gas, it follows that a balloon of one-eighth of the ordinary dimensions will, when filled with hydrogen, suffice for lifting the same load. The lifting power of one thousand cubic feet of pure hydrogen may be reckoned at 74 lbs. A balloon of twice that capacity would amply suffice to raise an intelligent lad to a height sufficient to enable him to watch the manœuvres of an enemy. The recent disasters in Zululand have shown how necessary it is that our army should be provided with some means of obtaining information as to the presence of even a small body of hostile natives; and the one objection which has prevented the employment in Zulu of military balloons, has been the utter impossibilty of transporting through the bush an ordinary balloon and the appliances for making the gas. It now appears, however, to be possible to construct a balloon in sections, which might be kept inflated for months, and which could be transported wherever a wagon could pass, or even across a country traversed only by footpaths. Another form which Mr. Board has suggested is that of a number of long cylindrical balloons placed side by side; each cylinder being of sufficiently small diameter to be capable of transport by natives through the bush. Mr. Board proposes that each section of the spherical balloon, or each separate cylinder, should also be divided into separate compartments by cross diaphragms of light, impervious fabric, so that a chance shot penetrating one section should not destroy the whole balloon. In fact, Mr. Board's suggestion proposes to do for balloons what engineers have done long ago for ironclad ships in introducing bulkheads between the separate compartments, thereby preventing the possibility of sinking the ship by a shot which penetrated one compartment. It is satisfactory to learn that these suggestions are likely to receive a fair trial. Mr. Glaisher, so well known for his scientific explorations in balloons, recently recorded his opinion that these suggestions constituted the most important advance that had been made of late in the

science of aeronautics; and on the eve of his departure from England, Sir Garnet Wolseley, under whose notice the invention was brought, expressed his opinion that the plan was well worthy of being tried.—*Engineering.*

Straw-Burning Steam Engines at the Kilburn Show, England.

[From *The Engineer*.]

THE most recent development of the portable engine has been the introduction of straw-burners for use in other countries. In the plains of Westphalia and many other regions straw is practically worthless, and is left on the field to rot or to shrivel away under a parching sun. To Mr. John Head, of the Orwell Works, Ipswich, is, we believe, due the credit of first appreciating the value of this straw as a fuel. With Mr. Schemioth he carried out an extended series of experiments, which resulted in the adoption of the system of burning straw, shown in the accompanying engraving, Fig. 1. This engraving explains itself, the straw being fed in through rollers and burned in a thin sheet, so to speak. The rollers are driven by a strap from the crank shaft. Most of the other principal agricultural engineering firms now build straw-burning engines. The system adopted by Messrs. Clayton & Shuttleworth we illustrated in our impression for June 13th. It has been deemed unnecessary to use feed rollers, a man with a fork supplying the straw through a large open mouth to the fire-box. We also illustrate in Figs. 2 and 3 the system adopted by Messrs. Garrett, of Leiston. In a series of trials very good results were obtained last year with an engine of this kind. The trials took place on May 6th, 7th, 8th; the engine was 8 horse-power nominal.

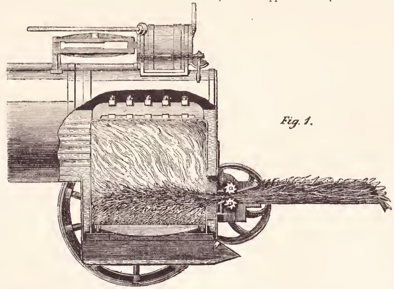


Fig. 1.

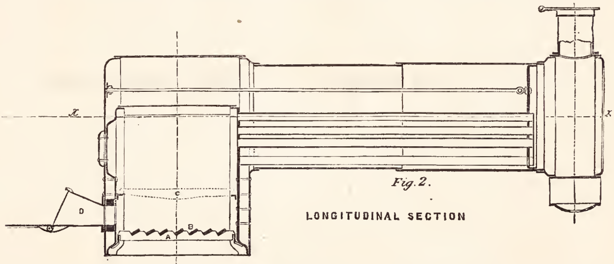


Fig. 2.

LONGITUDINAL SECTION

There is a special difference between the Head and Schemioth and what we may term the Garrett system of straw-burning, which deserves a moment's notice. The former is particularly adapted for burning long and unbroken straw, cane trash, reeds, and such like. In Spain and other countries in South Europe, where it is usual to reduce the straw by means of special machinery in connection with the threshing machine to a dry pulp for fodder, it is often desired to consume the straw in this reduced form for fuel, instead of using it in its unbroken state. It may appear at first sight an anomaly that straw should first be reduced by a machine absorbing so much power as a straw chopper, or more properly "straw pulper," and then burnt as fuel, and especially since this machinery is always so arranged that it can easily be disconnected from the straw shakers of the threshing machine; but it has been found that the pulping considerably increases the evaporative properties of the straw fuel, so that it really pays for the operation in this way, besides being more convenient of stowage for winter use. As much as 2.14 lb. of water can be evaporated with a pound of the pulped straw fuel, whereas it is difficult to obtain a better result than 1½ lb. of water per lb. of the unbroken material. There are, however, difficulties besetting the use of this short material—which requires an abundant supply of air for its perfect combustion—which Messrs. Garrett have overcome by means of the arrangement exhibited by them for the first time at Kilburn, the difficulty being, of course, to admit a sufficient supply of air between the fire-bars without allowing the short material to fall through between them. In Figs. 2 and 3 the various details may be thus described:—A are wrought iron bearer bars for the straw grate deeply notched to receive B, which are plain bars 3 in. by ½ in., arranged with a space of 4½ in. between each bar for the admission of air transversely of the fire-box in a slanting position, after the manner of a Venetian blind, so as to support the short material without allowing it to fall through between them. The dotted lines C C illustrate the ordinary fire-bars which form the grate upon the upper bearer bars for coal or wood, when it is not desired to burn straw or refuse vegetable materials. It is found a good plan to place a few of these fire-bars upon the upper grate when burning straw on the lower one, and so to form a sort of bridge, with

CROSS SECTION

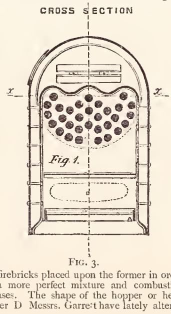


FIG. 3.

a few firebricks placed upon the former in order to effect a more perfect mixture and combustion of the gases. The shape of the hopper or heating chamber D Messrs. Garrett have lately altered to the wider and more oblong shape, as illustrated, rendering the grate more easy of access throughout its entire area. The lid of this hopper is also now arranged to fall downwards, as shown in the engraving, so as to form a table for the straw. This arrangement greatly facilitates stoking, in regard to which the chief and only secret is to keep the hopper well filled, in order to dry the fuel thoroughly before propelling it into the grate with a fresh supply, and also in order to prevent an undue admission of cold air above the fire, and to protect the stoker from the flame.

From Monad to Molecule.

[*From the Bridgeport, Conn., Standard.*]

THE SCIENTIFIC NEWS, published by S. H. Wales & Son, New York, contains, in the number for July 15th, 1879, the announcement of a discovery by Prof. F. G. Fairfield, of the New York College of Veterinary Surgeons, by which the magnifying power of object glasses in microscopes is increased, reckoning by areas, to over forty times the power of the best made lenses under the old systems. This tremendous stride in science has given Prof. Fairfield an opportunity to observe carefully that which has hitherto been beyond the reach of human vision assisted by the most scientific appliances, and in an article addressed to the Academy of Science, France, wherein he details the particulars of this discovery and its application, he says: "All that I shall at present claim is the discovery of a new department in the direct optical study of vital phenomena. What may be the ultimate result to science of further researches, experimental and optical, it would be rash as well as premature to predict. It may be very properly stated, however, that the monad now ceases to be the ultimate known subdivision of living matter, and that unless there is a connecting link between the monad and the molecule, the latter will be optically understood, and actually measured and described, before the nineteenth century is folded up and laid away in the great magazine of the past." Nothing more interesting than the summary of this article, as given in the NEWS for July 15th, has been recently published in the scientific world.

INHERITED MEMORY IN BIRDS.—Some interesting communications have lately appeared in *Nature* on this subject, accounting for the wonderful knowledge of routes and localities displayed by birds in their migrations, by the theory that the impressions made on the brains of the parents are transmitted to their offspring, and that which we call vaguely instinct is often inherited memory.

Mr. J. Sinclair Holden, writing to the same journal, narrates the following circumstance which is hard to explain on any other theory. He says:

"About twelve years ago I was residing in Ireland, on the coast of county Antrim, at the time the telegraph wires were set up along that charming road which skirts the sea for twenty-five miles between Larne and Cushendall. During the winter months, large flocks of starlings always migrated over from Scotland, arriving in the early morning. The first winter after the wires were

stretched along the coast, I frequently found numbers of starlings lying dead or wounded on the roadside, they having evidently, in their flight in the dusky morn, struck against the telegraph wires, not blown against them, as these accidents often occurred when there was but little wind. I found that the peasantry had come to the conclusion that these unusual deaths were due to the flash of the telegraph messages, killing any starlings that happened to be perched on the wires when working.

"Strange to say, that throughout the following and succeeding winters, hardly a death occurred among the starlings on their arrival. It would thus appear that the birds were deeply impressed, and understood the cause of the fatal accidents among their fellow-travelers that previous year, and hence carefully avoided the telegraph wires; not only so, but the young birds must also have acquired this knowledge and perpetuated it, a knowledge which they could not have acquired by experience or even instinct, unless the instinct was really inherited memory derived from the parents, whose brains were first impressed by it."

A LARGE TUG.—The Pittsburgh *Chronicle* says that the coal firm of W. H. Brown have recently entered into a contract with Krupp, of Essen, Germany, for the manufacture of a steel shaft for a new towing steamer now building in Pittsburgh; and then adds: "The boat will be ready by the time the shaft will arrive from the old country, and the firm is convinced that they have done the right thing to venture on this unusual step. It will, we hope, have the effect of developing another branch of industry in Pittsburgh. Not one of our steel manufacturing establishments possess the 'plant' necessary for casting and shaping such huge pieces of material as the necessities of the river trade demand. But that the manufacture of steel shafts will be introduced here is now a matter of certainty. A large establishment could find plenty to do, considering that we have seven or eight hundred steamboats in the Western waters, nearly one hundred and fifty being owned in Pittsburgh—the majority of which would seek to supply themselves with such shafts could they be furnished here. The shaft to be made by Krupp will be 27 feet long and 15 inches in diameter, tapering to 13 inches, and will weigh in the neighborhood of 20,000 pounds. The price for open-hearth steel is 9 cents a pound, free on board in New York. The wheel of the new boat will be 26 feet, with sixteen buckets, each 32 inches deep."

IMPROVED VULCANIZED INDIA-RUBBER.—M. Schwanitz, of Berlin, has devised a process of preparing a vulcanized India-rubber which resists the influence of fats or oils, while maintaining all its other ordinary characteristics. It consists in the addition of glycerine to the melted India-rubber before proceeding to vulcanize it. The India-rubber is manipulated between warmed rollers, after the addition either of the glycerine alone, or of glycerine with the other mineral or metallic substances usually employed, such as sulphate of zinc, white lead, chalk, flowers of sulphur, etc. A capital material is obtained from a mixture of 3 kilogrammes of India-rubber, 3 kilogrammes of chalk, 0·50 kilogrammes of glycerine (of sp. gr. 1·230), 0·10 kilogrammes of litharge, and 0·20 kilogrammes of flowers of sulphur. The objects made from this mass are vulcanized by laying them in a glycerine bath, and then exposing them to the influence of steam in a closed vessel under a pressure of two or more atmospheres, the length of exposure varying according to their size. For some of them the simple glycerine bath alone suffices. M. Schwanitz has patented his process for the German Empire.

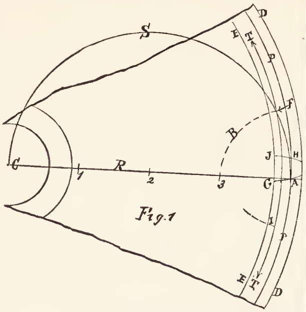


Fig. 1

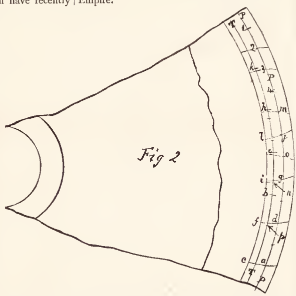


Fig. 2

"PATIENCE is a most necessary qualification for business; many a man would rather you heard his story than granted his request. One must seem to hear the unreasonable demands of the petulant unmoved, and the tedious details of the dull untired. That is the least price that a man must pay for a high station."

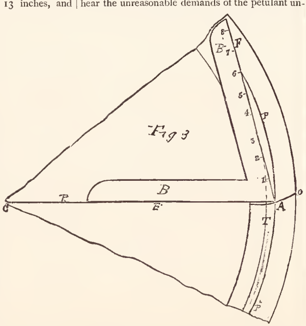


Fig. 3

Marking Out Small Gears.

BY JOSHUA ROSE, M.E.

IN reply to a request from several correspondents, we give below the method usually adopted in practice to mark out the teeth on small gears.

Small gears are usually given involute teeth, and the curves for such teeth may be struck with compasses, as follows:

In Fig. 1, let C represent the centre of a wheel, D D, the full diameter, P P, the pitch circle, and E the circle for the roots of the teeth, while R is a radial line. Divide on R, the distance between the pitch circle and the wheel centre, into four equal parts, as 1, 2, 3, etc. From point or division 2, as a centre, describe the semi-circle S, cutting the wheel centre and the pitch circle at its junction with R (as at A). From A, with compasses set to the length of one of the parts, as A 3, describe the arc B, cuttting S at F, and F will be the centre from which one side of the tooth may be struck, hence from F as a centre, with the compasses set to the radius A B, mark the curve G. From the centre, C, of the wheel, strike a circle, T T, and the centres wherefrom to strike all the teeth curves will fall on T T. Thus, to strike the other curve of the tooth, mark off from A the thickness of the tooth on the pitch circle, P P, producing the point H. From H as a centre (with the same radius as before), mark on T T the point I, and from I, as a centre, mark the curve J, forming the other side of the tooth.

In Fig. 2 the process is shown carried out for several teeth. On the pitch circle, P P, the divisions 1, 2, 3, 4, etc., for the thickness of the teeth and the width of the spaces are marked. The compasses are set to the radius by the construction shown in Fig. 1; then from *a*, the point *b* on T is marked, and from *b* the curve *c* is struck.

In like manner, from *d*, *g*, *j*, the centres *e*, *h*, *k*, *f*, wherefrom to strike the respective curves, *f*, *i*, *l*, are obtained.

Then from *m* the point *n*, on T T, is marked, giving the centre wherefrom to strike the curves at *h*, *m*, and from *o*, is obtained the point *p*, on T T, serving as a centre for the curve *e*, *o*.

To save the trouble of finding the position of the point F, Fig. 1, by the process shown in that Fig., a universal templet is sometimes employed. It consists of a piece of sheet metal (usually brass), such as shown by B B in Fig. 3, having its edges, E F, at an angle of 75 degrees and 30 minutes, and having one edge divided off into parts of an inch, as at 1, 2, 3, 4, etc. Suppose, then, that these divisions are quarter inches, and that the radius of the wheel to be marked off is 3 inches, then one-quarter of three inches (the radius) is ¾ (denoted on the templet at 3). The templet is placed with its edge, E, coincident with the radial line, R, its point coincident with the pitch circle at A; and the location for the centre, from which the tooth curve, O, may be struck, will be coincident with the location of Fig. 3 on the templet. From the centre, C, the circle, T, may be struck, cutting the location of Fig. 3 on the scale or templet, and the process carried out as in Fig. 2.

If the teeth are to have epicycloidal curves, they may be struck with compasses, as follows: In Fig. 4 let P P represent the pitch circle of a gear wheel on

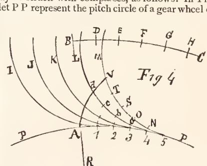
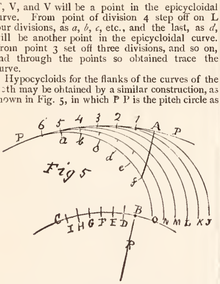


Fig. 4

which it is required to trace a portion of an epicycloidal curve for the tooth face. Suppose, then, that the tracing point on the generating or describing circle stood at A, then the centre of that circle will be at B, and if the circle be rolled around P P the path of its centre will be represented by the circle, B C. From A mark on P P a number of equal divisions, as 1, 2, 3, 4, 5, representing various points of contact of the describing circle with P P. Then the corresponding positions for the centre of the rolling circle will be at D, E, F, G, H, respectively; hence from D as a centre, with radius equal to that of the rolling circle, mark I representing the rolling circle in one position. From E as a centre, mark position J of the rolling circle, and so on, marking the positions up to M. With the compasses set to the radius of divisions 1, 2, 3, 4, 5, step off on arc M the five divisions N, O, S,

T, V, and V will be a point in the epicycloidal curve. From point of division 4 step off on L four divisions, as *a*, *b*, *c*, etc., and the last, as *d*, will be another point in the epicycloidal curve. From point 3 set off three divisions, and so on, and through the points so obtained trace the curve.

Hypocycloids for the flanks of the curves of the teeth may be obtained by a similar construction, as shown in Fig. 5, in which P P is the pitch circle as



before, and B C the line of motion of the centre of the rolling circle, to be rolled within P P. From 1 to 6 are points of equal division on the pitch circle, and from D to I are the locations of the centre of the rolling curves for the respective positions of the rolling circle; thus I is the centre for position 6, and arc O. H is the centre for position 5 and arc N, and so on; *a*, *b*, *c*, *d*, *e*, *f*, are 6 divisions on O corresponding to the 6 divisions on P P, and the point *f* is a point in the hypocycloid.

It is easily demonstrable that this construction is correct, because the arc V 5, Fig. 4, is equal in length to the arc A 5, the former, in fact, having rolled upon the latter. So likewise the arc 4 *d*, is equal to 4 A. and so on.

The Suspended Animation Hoax—"Scientific Resurrection."—Under this title we recently published an account of suspended animation, taken from the *Brisbane Courier*, which has been republished in the English papers, and given rise to no small amount of comment. The *Courier* now acknowledges it has been the victim of a hoax, and all those people who have been contending for the possibility of suspending animation for long periods, have been "sold."

Poultry Fattening Apparatus.—A curious exhibit at the Kilburn Show, in England, was an apparatus shown by M. Odile Martin for fattening poultry. This is a most ingenious invention for bringing poultry to the adipose state in which the gourmand especially delights. It is a revolving apparatus, including several circular rims or shelves, which are divided into separate compartments for some 200 odd birds. These are tied by the legs by means of small bands of skin fastened by small chains, which leave the biped full liberty of movement in his own separate pen. It is connected with a feeder which contains the food to be forcibly consumed by the poultry submitted to the process. From this patent feeder is appended a mouthpiece. As the bird revolves in its turn, the operator places the mouthpiece in the throat of the bird, sets his foot in a pedal, and at once the food is forced into the stomach. The food is liquid, being composed of barley meal and maize mixed with water. A red plate placed in front of each bird indicates the quantity to be given; the operation is performed with great rapidity, and the birds do not suffer at all. In one hour one man can feed from 400 to 500 birds.

Asphalt and Timber Floors.

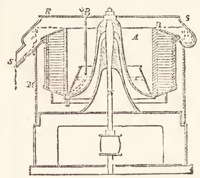
A curious method of laying down floors has been adopted in France, and is said to have obtained a wide application. It consists in putting down flooring, not as hitherto, on joists, but in imbedding the boarding in asphalt. The new floors are mostly used for ground stories of barracks and hospitals, as well as churches and courts of law. Pieces of oak, usually 2½ in. to 4 in. broad, 12 in. to 30 in. long, and 1 in. thick, are pressed down into a layer of hot asphalt not quite ½ in. thick, in the well-known herring-bone pattern. To insure a complete adhesion of the wood to the asphalt, and obtain the smallest possible joints, the edges of the pieces of wood are planed down, bevelling towards the bottom, so that their cross section becomes wedge-like. Nails, of course, are not necessary, and a perfect level surface may be given to the flooring by planing after the laying down. The advantages of this flooring, which only requires an even bed on which to rest, are said to be the following:

1. Damp from below and its consequences, rot, are prevented.
2. Floors may be cleaned quickly and with the least amount of water, insuring rapid drying.
3. Vermin cannot accumulate in the joints.
4. Unhealthy exhalations from the soil cannot penetrate into living rooms. Asphalt being impermeable to damp, rooms become perfectly healthy, even if they are not vaulted underneath. In buildings with several stories, as in hospitals, the vitiated air of the lower rooms cannot ascend—an object which it has hitherto not been possible to attain by any other means.
6. The layer of asphalt will also prevent the spreading of fire from one floor to another in case of conflagration. The flooring here described has been laid in the numerous casements of the newly-constructed forts round Metz, to the satisfaction of the authorities. The cost is about a shilling per square foot. This estimate, somewhat high, would be much lower in districts where oak and labor are cheaper, and the distance from the places of construction less, and especially where there is more competition among contractors than at Metz, and the cost for large undertakings may be reduced to eight shillings per square metre.

Wannieck's Centrifugal Apparatus for Separating Cream from Milk.

A very interesting application, to the separation of cream from milk, of the principle that liquids of different specific gravities may be separated by the action of centrifugal force, has been made by Mr. Wannieck, one of the exhibitors at the recent Kilburn Agricultural Show in England. The engraving by which we illustrate this invention is a central vertical section of the machine.

The drum A of the machine contains the milk to be treated. This drum revolves on a central vertical shaft and carries a couple of internal paddles or radial projections which insure that the milk shall be carried around at the same speed as the drum.



At the top the drum is partly closed by the cover B, while within is a conical diaphragm C, which reaches nearly to the bottom of the drum. A funnel D dips into the drum within the conical diaphragm, this funnel being supported by the cover E, which does not revolve, but which is attached to the external casing M of the machine.

The external case carries at its top an annular trough S, this trough being furnished at one side with a discharge spout S. The revolving drum is furnished at the bottom with discharge cocks T. The method of driving the machine may be much varied, and is not shown in the engraving. The following method is the one at present employed: The base of the machine is connected to a couple of pieces of timber which carry standards for supporting a short horizontal countershaft provided with fast and loose pulleys and a larger pulley from which a twisted belt is led off to the pulley on the vertical shaft of the revolving drum. The speed given to the latter is 1,000 revolutions per minute, and the belt driving it passes under a tightening pulley, adjusted by lever; this tightening pulley enabling the drum to be started gradually. A light belt on the vertical shaft of the drum gives motion to a revolution counter which guides the operator in securing the proper speed, an essential in any apparatus of this sort.

The drum having been charged with milk to a given height, either by measure or by a mark on the interior, is set in motion, and as the speed increases the milk finally assumes the position indicated in the engraving, the cream forming an interior stratum, represented by the short oblique lines; the milk a middle stratum, represented by horizontal lines, and the dirt forming a layer which adheres to the vertical part of the shell of the drum. The particles of the milk, under the influence of the centrifugal force to which they are subjected, have a tendency to arrange themselves in layers in the order of their specific gravity, the heavier particles moving outwards, while the light or fatty particles of the cream collect on the inner surface of the liquid column. The action of the centrifugal force being much more energetic than the ordinary action of gravity, this separation of the different particles of milk takes place very much more rapidly than when milk is allowed to stand in the usual way; and after the drum has been running at from 800 to 1,000 revolutions per minute for from 25 to 30 minutes, the cream is found to have collected on the inner surface, as indicated, while all dirt in the milk has been thrown outwards against the side of the revolving drum.

The next operation is to remove from the revolving drum the cream thus collected. This is effected as follows: It will be noticed that the amount of the charge of milk is such that when it is, by the action of the centrifugal force, thrown into the form of an annular column, the inner circumference of the column is just level with the inner circumference of the partial cover B of the drum. To remove the cream, some milk—generally skim milk—is poured down the funnel D, and falling within the conical diaphragm C, passes under the lower edge of the latter, as indicated. The milk so introduced passes into the charge without disturbing the layer of cream, and the latter being displaced inwards, flows over the inner edge of the annular cover B, and escapes into the trough S, from which it is discharged into suitable vessels through the spout S. The cream having been thus collected, the machine is stopped, and the skimmed milk run off through the cock T.

With two machines containing 11 gallons each, 250 gallons of milk can be effectively skimmed in a day of ten hours, while the operation requires no skilled labor and but very ordinary care. Owing to the short time required, also, all chance of the milk turning sour is avoided, and the butter made from the cream is considered of first-rate quality. Another advantage of this system, which was not at first counted upon, lies in its thoroughly separating from the milk all dirt which may have become mixed with it either during the process of milking or subsequently. This dirt, which collects as indicated in the engraving and above described, smells badly, and an astonishing amount of it is separated by the centrifugal action even from milk which has been carefully filtered through hair-cloth, thus showing that the straining or filtering usually relied upon is far from being thoroughly efficient.

Appearance of Ichneumonidæ in Wilmington, Delaware.

Mr. J. B. Bell, one of the editorial staff of *Every Evening*, published at Wilmington, Del., sends an interesting account, published in that journal, of the recent appearance of one of the *Ichneumonidæ* in that city. We can find place only for very brief extracts from this well-prepared article:

"The *Ichneumonidæ* are very numerous. Grovenhorst's 'Ichneumonologia Europœa' enumerates nearly sixteen thousand European species, and other entomologists state that they are equally common in many other parts of the world. Jaeger says that 'if one should undertake to describe the genera and species of the American, Asiatic, African and Australian *Ichneumonidæ*, of all of which little is known, he would occupy more than twenty large volumes.' Chambers' Encyclopædia says they are extremely numerous in the Eastern United States, but this is, doubtless, a mistake, as they are certainly not very common either in Delaware, Virginia or North Carolina; or, at least, the species known as the *pimpla lunator*, the subject of this article, is not common. There are many very small species of the *ichneumon* fly, and it may be these to which reference is made, as above noticed."

"A local paragraph in a recent issue of *Every Evening* called attention to a strange and interesting species of insect, which for some months past has frequented a maple tree at the northeast corner of Sixth and Shipley Streets. The insect was first observed about three months ago, and since then its peculiar operations have been witnessed from time to time by crowds of curious people."

"A well-known gentleman and amateur entomologist, seeing the description of the insect, suggested that it was probably the celebrated *ichneumon* fly, a specimen of which he had seen about twenty years ago on an old tree near Middletown. An examination of Woods' "Insects and Their Habits" proved this surmise to be correct, and further showed that our insect belongs to the largest and finest group (*pimpla lunator*) of that numerous family of the insect world known under the general title of *Ichneumonidæ*, signifying a similarity between some of their habits and those of a genus of digitigrade carnivorous quadrupeds of the same name. The *ichneumon* fly is an interesting and useful insect, and a couple of fine specimens, male and female, of the order above named, *pimpla lunator*, now in our possession, reveal many of the delicate beauties of insect structure."

"It is a singular fact that the presence of the insect in this city is confined almost exclusively to

the tree above mentioned, none having been observed, we believe, at any other point."

The writer suggests that perhaps the habits of many of the *Ichneumonidæ* are nocturnal, and that they thus escape observation.

"The *ichneumon* fly is parasitic by nature, and the chief aim of its existence seems to be the destruction of various noxious insects. This they effect not by a direct attack on the insects themselves, but by depositing their eggs in the larvæ of their enemies, which they find in holes in the bark and wood of trees. It should receive no ill treatment, as it is extremely useful to the farmer and gardener in the manner described."

Medicinal Value of Linseed.

At the recent meeting of the American Dermatological Association Dr. Sherwell read a paper on "The Use of Linseed and its Oil as Therapeutic Agents in Diseases of the Skin." Every dermatologist, he said, had seen the necessity of introducing fats into the system, and hitherto almost the only available hydrocarbon had been cod-liver oil. This disagreed with many patients, and was also open to a number of other objections; while, in the more palatable form of the commercial emulsions now frequently employed, he did not consider it trustworthy. A more assimilable fat was therefore desirable, and he thought he had discovered it in the flaxseed. Linseed tea is a well-known domestic remedy in this country. He had been induced to try its use by observing the beneficial effects of linseed cake upon cattle and horses, both in making their coats sleek and improving their general condition; and his experience had shown that the agent was of equal service to the human economy. He was in the habit of employing it in a threefold administration. 1. If the patient were a male and had sound teeth, the seed itself was the best form in which to take it. The man could carry about ten ounces of this in his pockets, and would probably consume a teacupful in the course of a day. The ordinary domestic linseed was small and dark in color, and contained only about twenty per cent. of oil; while that from Bombay or Calcutta (which was the kind recommended) was larger, lighter in color, and contained about thirty per cent. of oil. 2. In the case of women or children the ground seed, mixed with milk in the form of a porridge, was more desirable, and was unpalatable to very few persons. 3. In certain cases it could be given in the form of bread, although he did not consider this method quite so efficient as the others. The bread could be made by mixing linseed meal with flour in any proportion desired. This was suggested by Dr. Piffard.

When linseed was eaten, a natural emulsification was performed with the recent oil found in the stomach, and it had been established by chemists that a recent oil was much more active than one which had been long exposed to oxidation. The hulls also served to stimulate the peristaltic action of the intestines. He believed it had specific virtues in dry and scaly diseases of the skin, both on account of its special action upon the sebaceous secretion and its effect in improving the general condition of the patient. Dr. Sherwell gave four cases of skin disease of great obstinacy and severity, in which its curative influence was most happily shown. The seed was given internally in one of the forms above mentioned, and the oil applied externally. The lubricating effect of the latter was most admirable, and it had the advantage over most other oils of not becoming rancid when exposed to degraded epithelium. In eczema he was in the habit of wrapping the parts affected in a number of folds of linen saturated with it. He believed that flaxseed is a specific remedy for the sebaceous glands, increasing their secretion when it was diminished, and restoring it to its natural character when it had been altered by disease. Dr. Van Harlingen, however, stated that he had used linseed in one case, in the form of the oil internally; but he thought there was no beneficial result from it. This, he said, might possibly have been due to the fact that he used the ordinary domestic oil, and not that made by Bombay linseed. Dr. Piffard had said he had used the linseed oil internally, and he thought it was better than the cod-liver oil in many respects. Cod-liver oil itself was fattening, while the iodine which it contained was just the reverse of this; and he thought this might explain why it was that it was impossible to fatten some persons on cod-liver oil. The linseed, he believed, contained no starch, and it was, therefore, especially useful in diabetic patients with skin trouble, as well as affording an agreeable change of diet to them. The taste of this bread was not agreeable to many individuals at first; but it was, at all events, much more agreeable than cod-liver oil.

Dr. White remarked that the so-called breads for diabetics invariably contained a certain amount of starch, and, therefore, if linseed was really free from starch, it was an important point to remember.

Quick Tanning.—According to the recent process of Klemm, of Stuttgard, the time required for tanning a calfskin has been reduced to sixteen hours, and that for an oxhide to two-and-a-half days, but a more recent method, patented by Montoison, of Manchester, promises to accomplish the same in from a few hours to one day. At a trial made of it before experts, a sheep was slaughtered and skinned, and the wool was removed from the hide in half an hour, by spreading it with a chemical re-agent, without the aid of a scraper, and the hide, after having been placed in lime-water to neutralize the chemical agent, was passed through several chemically prepared baths, which required but a few minutes, and was then washed and dressed in the usual way, and converted into marketable leather, only four hours having been consumed in all.

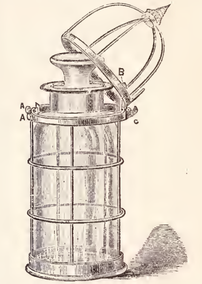
Prof. Proctor on Predicted Planetary Troubles.

"I have received so many letters," says Mr. R. A. Proctor, in the *Newcastle Daily Chronicle*, "asking me what truth there may be in the announcement that terrible troubles are to be brought upon the earth by the planetary movements between 1880 and 1887, that I suppose there really must be a certain considerable section of the people of this country who really believe in these preposterous predictions. Whether the American 'professor' (every one who writes or speaks about matters in the remotest degree relating to science is a professor in America) who announces these coming troubles is in any way related to the New York astrologer who wants money for calculating the planets, I do not know. But certainly they play into each other's hands. To say the truth, as the *Athenæum* recently pointed out, astrology has been looking up of late; a mischievous result of the theories which have been recently propounded respecting the influence of sunspots on the weather, commerce and other matters—theories notoriously propounded in the first instance in order to obtain money from Government for certain greedy scientists who were to watch the sun for us, and promised all manner of good things when once the money had been advanced. I do not think the Government is very likely to waste any money over such experiments, and, indeed, the Physical Observatory advocates have latterly been far less noisy than of yore, feeling, perhaps, that they had shown their hand somewhat prematurely. But much mischief of another kind has resulted. Because these persons, and some who innocently enough had joined them, assert that sunspots affect terrestrial relations in certain definite and ascertainable ways (for which statement there is not a particle of valid proof), and because it is supposed that the planets affect the sunspots (for which supposition also there is no evidence whatever, but very strong evidence against it), we are to believe that, after all, the old astrologers were right, and the planets influence the fates and futures of men, not directly, but still effectively, though indirectly. Of course even the advocates of sunspot influence, and the believers in planetary power to generate sunspots, would reject this preposterous inference. But it finds acceptance among the ignorant; and those rascals who are always on the watch to find new ways of swindling the public, take advantage of the fact. It ought not to be necessary for me to say a word about the grim tidings announced by the American 'professor,' for they have not a particle of scientific significance. But in so far as such predictions (save the mark!) are based on the idea that the planets influence the sun's photosphere, I may say so much as this, that instead of the giant planets Jupiter, Saturn, Uranus and Neptune, being the chief solar disturbers, even according to those students of science who maintain this theory, Venus would be and is more powerful than any of those planets, and our earth more powerful than the three outermost of the giant planets. To see this it is only necessary to remember that the tide-raising power of a planet or other orb (that being the nature of the influence assumed according to this theory) does not diminish as the square of the distance increases, but as the cube of the distance increases. Thus, putting Saturn's distance at only 9 instead of 9½ (that of the earth as unity), and the mass of Saturn at 90 times the earth's, Saturn's influence would be to the earth's as 90 to the cube of 9—that is, as 90 to 729, or less than ⅛th of the earth's. Jupiter's would exceed the earth's (roughly) as 300 exceeds the cube of 5, or as 12 exceeds 5; but would be far less than that of Venus. Then, again, the simple conjunctions and oppositions of the most effective planets would be far more effective than the perihelion passage of all the planets. Since we survive the conjunctions of the Earth and Venus, we are not likely all to perish even though the giant planets should all pass their perihelia at about the same time, which, however, never has happened within historic times, and certainly will not happen for many centuries to come."

Shop and House Hints.

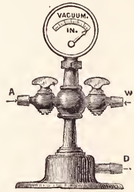
Indelible Ink.— A German exchange says that an indelible ink, free from nitrate of silver, may be prepared by braying 1·75 grammes of aniline black with 40 drops of hydrochloric acid, and 42 grammes of alcohol, and diluting the resulting mixture with a hot solution of 2·5 grammes of gum in 170 grammes of water. If a solution of 2·5 grammes of shellac in 170 grammes of spirit be used instead of the gum water, a deep black ink is produced, which may be used for writing on wood, brass or leather.

Poison-Bottle Cage.—This is a useful invention, which, it is stated, will be shortly put upon the market by the inventors through the usual channels of trade. It scarcely needs a description. It is made of



stout wire, and may be provided with a solid cap and a lock, which would be useful for the isolation of some palatable slow poisons, which too often prove very enticing to servants of the Sairey Gamp order.

Improvement on Korting's Water Column Vacuum Pump.—*New Remedies* considers this pump, in the form shown, to be an improvement upon the other forms hitherto used for accelerating filtration, by means of a vacuum formed by the traction or pressure of a water column, as it may be placed more easily in any position on the laboratory table. The

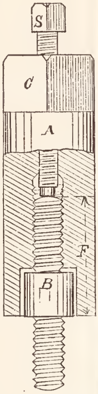


apparatus has two inlets at A and W, and one outlet at D. A stream of water, with a pressure *equal to 15 feet*, is allowed to pass in at W, from whence it is forced through a very small jet downwards, and is forced out at D, at the same time pulling with it a quantity of air entering at A, with which the water mixes before issuing at D. The orifice, A, being connected by means of flexible tubing with the receptacle into which the filter fits air-tight, this receptacle thereby becomes exhausted of air, and the filter operates with increased celerity, owing to the pressure of the atmosphere. But while the suction of the water causes a vacuum in the filter receptacle, it also exhausts the vacuum gauge fastened on top of the apparatus. The gauge consists of a hollow spiral made of thin brass plates, the loose point of the spiral carrying the index, which is outside the box, which serves merely as a protection for the same. As soon as the interior of the spiral becomes exhausted of air, it contracts by curling up, and thereby rotates the index along the scale, which is graduated specially for each instrument.

The other end of the spiral is connected, air-tight, with the vacuum-exhaust. Having been placed or fixed on the table, the connections are made with rubber hose or permanent pipes of iron, lead, etc. If rubber hose is used, the thicker kinds should be selected, to prevent flattening when exhausted, and all kinks should be carefully avoided.

The water which is to be passed through the apparatus must be perfectly clear; otherwise a strainer must be put in the water-connection, with openings of *not more than* $\frac{1}{16}$ inch. With a water-pressure of 15 lbs. nearly a complete vacuum is produced. There need be no extra length of the discharge pipe, but the water

can be run directly into the nearest convenient waste-pipe or receptacle. If no pressure of water is at disposal wherewith to connect direct, the necessary height can easily be obtained by fixing a barrel at the height of 15 feet above the apparatus, and filling the same by a small hand-pump. The quantity of water required is one gallon per minute. The price of the apparatus complete, as shown in cut, is $16.00. It is made by Messrs. Schutte & Goehring, Twelfth and Thompson Sts., Philadelphia, Pa.

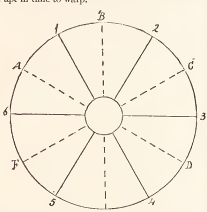


Stud Inserter.—An excellent tool for inserting studs is shown in the accompanying figure. It consists of a piece of iron A, tapped at one end to receive the stud B, and squared at C to receive a wrench. S is a set screw to regulate the depth to which the stud shall enter, as denoted by F.

Coating Copper with Iron.—Professor Bœttger recommends the following solution for coating copper plates with iron. Ten parts of ferro-cyanide of potassium and twenty parts of tartrate of soda are dissolved in 220 parts of distilled water, adding a solution of three parts sulphate of iron in fifty parts of water. Caustic soda solution is then poured into the mixture until the Prussian blue formed is re-dissolved.

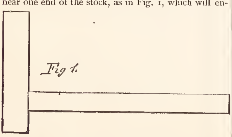
Malleable Brass is made by alloying 33 parts of copper and 25 of zinc, the copper being loosely covered with the zinc in the crucible. As soon as the copper is melted, pure zinc is added. The alloy is then cast into moulding sand in the shape of bars, which are malleable into any form when still hot.

Polishing Wheels should be put together in sections and layers, as shown in the engraving. 1, 2, 3, 4, 5 and 6 form one course of segments, over which should be glued segments, the joints of which "break" those of 1, 2, the same as in the figure. Each course of segments should have a day and a night to dry before a second one is added, otherwise the wheel will be apt in time to warp.



Removal of Ink-Stains.—Ink stains on white linen are removed with tolerable ease by a variety of applications, most of which, however, attack the texture of the material more or less, so that it is apt to wear out prematurely; but similar stains in colored fabrics are less readily treated, for what removes the ink mark will, in most cases, destroy their color also. We read in a Continental exchange of a method which has the great advantages of neither injuring the material, nor affecting in the least the most delicate shades of color, while it effectually removes the ink. It consists simply in dipping the stained part into pure hot melted suet or tallow, and washing it when cold in hot water, which, it is asserted, will remove the ink together with the fat.

Machinists' T Squares should have their blades near one end of the stock, as in Fig. 1, which will enable a given size of square to be used for larger work than would be possible with the blade in the middle of the stock. This is demonstrated in Fig. 2, in which W is a piece of work having two jaws B C, the truth of the face C of A being tested, and in which b' represents the square-back and E the blade.



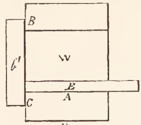
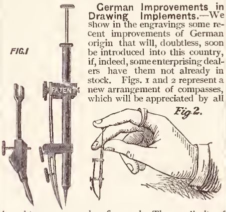


FIG. 2.

Dyeing Kid Gloves.—A German trade journal dedicated to the interests of dyers and stainers gives the following directions for the home treatment of kid gloves and similar small articles, which we reproduce here, as being of possible use to some of our readers. The first step in the proceeding is to fill the gloves tightly with sawdust, and then sew up their free extremity. The further treatment, of course, depends on the color which it is desired to impart to them. *Black.*—Brush over with a tolerably strong solution of chromate of potash; allow this to soak in a little, and then brush again with a strong decoction of logwood, to which a little sulphate of iron (blue vitrol) has been added. *Fast Brown.*—Brush over with a solution of alum; then boil a strong decoction of logwood, fustic, and Guinea redwood, and brush over again with this when cool. *Violet.*—Brush first with alum solution, and then with a solution of methyl violet. *Grey.*—Brush first with a solution of sulphate of iron, and then with a weak decoction of sumach.



German Improvements in Drawing Implements.—We show in the engravings some recent improvements of German origin that will, doubtless, soon be introduced into this country, if, indeed, some enterprising dealers have them not already in stock. Figs. 1 and 2 represent a new arrangement of compasses, which will be appreciated by all draughtsmen engaged on fine work. The peculiarity of this instrument consists in the arrangement of the centre-point, which remains stationary whilst the pen or pencil, resting by its own weight on the paper, is guided round by gently turning, without pressure, the small knob at the upper end of the tube. By this means the misplacing or sliding of the centre-point and the cutting of the paper by the pen are avoided. By means of this fixed centre-point any number of concentric circles may be drawn, without making a hole of very distinguishable size on the paper. The pen can be regulated without lifting the instrument itself off the paper, and even the most minute circles can be formed neatly

FIG. 3.

and quickly. Fig. 3 illustrates an improvement in bow-pens, by which the thickness of ruled lines may be accurately graduated. The head of the adjusting screw in this pen is made rather larger than usual, and is divided at the under side into twenty divisional notches, each alternate notch being marked by a figure on the face. By this arrangement a uniform thickness of line may be maintained after filling or clearing the pen, and any desired thickness may be repeated, without any loss of time in trial of thickness on the paper. A small spring automatically holds the divided screw-head in any place. With very little practice the click of the spring in the notches becomes a sufficient guide for adjustment, without reference to the figures on the screw-head. Another meritorious feature of this pen is that it is armed with sapphire points, which retain their sharpness very long, and thus save the time and labor required to keep ordinary instruments in order for the performance of fine work.

SPURIOUS EMERALDS.—Mr. Bryce Wright, in a letter to the *Times*, calls the attention of jewelers and the public in general to a series of spurious emeralds which are now being offered for sale. They are totally distinct from any previous imitations, and are made with flaws to more closely imitate the real, which are seldom met without some slight defect. He has not yet been able to determine their composition, but is of opinion that they are a preparation of alumina somewhat similar to the sapphire made by Messrs. Pfeil & Co., Paris, and exhibited at the late Exhibition. They can be detected readily by their specific gravity, which is as high as 3.402, while the true emerald never exceeds 2.76.

GREEN COLORING MATTER FROM COFFEE.—M. Zech announces his discovery of a simple method by which an innocuous green pigment, suitable for coloring sweetmeats, preserved vegetables, etc., may be extracted from coffee. The berries are first soaked, and the oil then removed from them by the action of alcoholic ether. They are then dried, and shaken up with white of egg, and the species of marmalade thus obtained exposed to the atmosphere for a few days. The presence of the albumen of the white of egg determines the appearance of a magnificent emerald green. Another equally easy way of obtaining the coloring matter is to simply steep the berries in water, after they have been bruised, and deprived of their oil by washing with alcohol.

List of Patents Granted July 22d and July 29th, 1879.

WE will supply copies of any of the patents in this list, post-paid, to any address in the United States or Canada, on receipt of 50 cents per copy.

PATENTS GRANTED JULY 22D, 1879.

Addressing-machine, H. D. Farquharson	217,685
Air and steam engine, combined, J. M. Whiting	217,758
Air-compressor, W. Thomas	217,834
Alarm-clock, W. McAdams, Jr	217,809
Animal-clamping hook, J. Robertson	217,747
Automatic gate, T. R. Cook	217,680
Axle-box and journal, vehicle, J. A. Manning	217,698
Baling-press, M. Loeser	217,806
Band cutter and fruit-picker, wire, G. S. Curtis	217,681
Barrel-stand, J. Salter	217,749
Bedstead-fastener, M. Krickl	217,802
Bit-brace, C. H. Amidon	217,672
Boiler-furnace, F. P. Everhart and C. M. Kingsbury	217,786
Boiler-furnace, steam, H. Mason and E. R. Lor.ng	217,699
Bolt-lock, G. Kator	217,692
Book, copy, H. W. Ellsworth	217,733
Boot and shoe, J. W. Winn	217,761
Boot and shoe sole pressing machine, T. J. and T. H. Gifford	217,687
Bottle-stopper, J. Annear	217,764
Bow, E. S. Morton	217,741
Brake apparatus, fluid pressure, G. Westinghouse, Jr	217,836
Brake relief-valve, automatic, G. Westinghouse, Jr.	217,838
Brakes, piston-diaphragm for power, G. Westinghouse, Jr.	217,837
Butter-package, W. White	217,839
Buttons from blood and other material, manufacture of ornamental, W. F. Niles	217,705
Car-coupling, C. Ahrenbeck	217,763
Car-coupling, P. M. Bracelin	217,726
Car-coupling, J. M. Dyer	217,846
Car-coupling, W. W. Scott	217,821
Car-coupling, S. S. Watrous and W. Gerber	217,757
Car-wheel fenders, railway, C. E. Brown	217,676
Car-wheel mold, W. Wilmington	217,840
Carriage-top prop, H. A. Robertson	217,746
Catheter, A. Shiland	217,711
Centrifugal machine, S. S. Hepworth	217,689
Check-hook, G. J. Letchworth	217,805
Chill-mold, J. Oliver	217,815
Churn, E. W. Bullard	217,678
Churns, cream and milk trap for, H. A. Noe	217,742
Coffin, J. McCarthy	217,739
Coin-holder, J. C. Stevens	217,829
Condenser, steam-engine, W. L. Church	217,845
Corset, J. D. Banfield	217,721
Cotton-press, G. Cooper	216,776
Counting-register, E. Stalmann	217,827
Crib, folding, D. Walker	217,716
Cultivator, G. Moore	217,811
Cutlery-seourer, H. P. T. D. de St. Leger	217,714
Dental vulcanizer, J. S. Campbell	217,728
Door-check, A. Witte	217,762
Ear-muff, H. E. Bonham	217,768
Eave-trough, F. Otto	217,848
Electric lighting apparatus, A. W. Hall	217,792
Electric machine, Dynamo, C. F. Brush	217,677
Electro-magnetic motor, J. Doyle	217,731
Electro-magnetic motor, J. C. Ludwig	217,807
Elevator, H. Snowden	217,825
Envelope, L. H. Rogers	217,707
Eyeglasses, G. C. Daboll	217,778
Eyeg asses, nose-clamp for, N. Watry	217,835
Fanning-mill, T. Willson	217,760
Farm-gate, W. R. Kramer	217,801
Feathers, method and machine for shaving or splitting and withing the shafts of, G. M. Richmond (reissue)	8,821
Fence-wire, machine for barbing, G. C. Baker.	217,673
Fertilizers, apparatus for treating animal matters for, J. McLaren	217,701
Fifth-wheel, vehicle, J. Spreyer, Sr	217,826
Fire-arm sight, W. H. Broden	217,770
Fire-arm sight, O. D. Warfield	217,717
Fluting-machine, G. Adreance	217,670
Forge, emery-wheel, and drill, combined, P. B. Hillyer	217,795
Gas, apparatus for enriching illuminating, J. and J. Kidd	217,800
Gas-regulator, J. W. Eichler and H. Hartig	217,784
Gas-retort, T. F. Rowland (reissue)	8,815
Gate, G. W. Addis	217,720
Gate, J. Clore	217,774
Glass, &c., engraving and dressing, R. A. Sawyer	217,709
Glass-pipe, apparatus for the manufacture of, J. B. Ford	217,789
Globe, terrestrial, H. Allen	217,671
Glove, T. Munthe	217,814
Glove, husking, H. W. Price	217.818
Grain-binders, knot-tier for, G. B. Morton	217,812
Grain-drill, B. Regan (reissue)	8,819
Gun-wad, W. F. Budd and J. W. Ogden	217,727
Gun-wiper, J. P. Simons	217,752
Hat sizing or fulling machine, R. Eickemeyer	217,783
Hat sweat-leather, G. H. Dimond	217,683

Hatchway-door-operating device, G. K. Bancroft.. 217,842
Hides, machine for treating raw, A. C. Krueger... 217,803
Hinge and roller, gate, J. B. Bolinger.......... 217,674
Hog-cholera compound, C. Brown.......... 217,772
Horseshoe toe-weight, A. Fischer.......... 217,686
Hot-air furnace, W. F. Beecher.......... 217,723
Hot-air heater, T. F. Hemmich.......... 217,794
Inhaler, H. R. Hurd.......... 217,691
King-bolt clip, G. E. Kerlicks.......... 217,799
Kitchen-cabinet, J. R. Kivett.......... 217,694
Lamp, electric, J. C. Porter.......... 217,744
Lamp-extinguisher, C. B. Pedlar.......... 217,816
Lamp, miner's, J. H. Gable.......... 217,791
Lap-table, work-box and work-stand, combined, M. Byrkit.......... 217,679
Latch, E. A. Kimball.......... 217,693
Letter-box, H. R. Robbins.......... 217,820
Liniment, J. Mayer.......... 217,808
Mash, machine for mashing and mixing brewer's, C. Stoll.......... 217,830
Matches, shipping package for, O. C. Barber...... 217,765
Meats, preserving, J. M. Dillon.......... 217,779
Middlings-purifier, J. Fitz.......... 217,788
Monkey-wrench, B. W. Lloyd.......... 217,697
Mop-head, W. H. Thayer.......... 217,832
Mop-wringer, W. Boswell.......... 217,675
Mop-wringer, W. H. Thayer.......... 217,833
Musical instrument, mechanical, G. B. Kelly and M. J. Matthews.......... 217,798
Oatmeal-machine, S. F. Butts.......... 217,844
Ore and rock crusher, T. R. Timby.......... 217,754
Ore-washer, E. Bazin.......... 217,722
Organ-reed, C. N. Rand.......... 217,706
Paper-box machine, P. Cook.......... 217,729
Paper-cutting shears, C. Brombacher (reissue)...... 8,816
Paper-fastener, G. B. Thayer.......... 217,831
Paper for wrappers for cigars, &c., preparing, J. W. Bolles.......... 217,767
Piano-fortes, device for leveling the key-frames of, C. F. T. Steinway.......... 217,828
Planter, corn, L. J. Corbin.......... 217,777
Planters, check-row attachment to seed, G. S. Simpson.......... 217,751
Plow, C. O. Wilder.......... 217,759
Pocket-flask and drinking-cup, combined, F. Knoblauch.......... 217,695
Printing-machine for paper-hangings, J. J. Janeway 217,735
Projectile, A. L. Varney.......... 217,756
Pyrometer, A. H. Seyferth.......... 217,822
Rail and telegraph-conductor, combined, P. Bargion.......... 217,766
Railway-chair, J. Wodiska.......... 217,718
Railway-track, portable, J. Turl.......... 217,755
Railway water-tanks, watering-column for, J. N. Poage.......... 217,817
Reamer for deep wells, C. A. Mentry.......... 217,740
Rein-supporter, C. T. Grilley.......... 217,688
Saccharine and other liquids, apparatus for concentrating and crystallizing, M. M. Monsanto and T. Gannon.......... 217,702
Salt, process and apparatus for the manufacture of, W. W. Elmer.......... 217,684
Sash-lock, H. T. Raeke.......... 217,819
Sash-supporter, G. W. Shaw.......... 217,750
Saw cleaner, cotton-gin, R. S. Munger.......... 217,813
Saw drag, D. Heller (reissue).......... 8,818
Sawing machine, drag, W. Dyke.......... 217,780
Sewer-trap attachment, W. Wilson.......... 217,841
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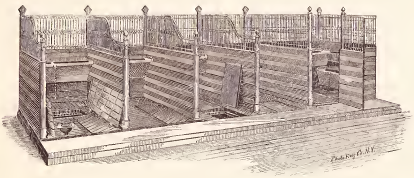

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